Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section §303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list (a "§303(d) list") of impaired waters. Currently this list must be published every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

This document addresses the water bodies in the Palouse River Subbasin that have been placed on Idaho's current §303(d) list.

This subbasin assessment (SBA) and TMDL analysis has been developed to comply with Idaho's TMDL schedule. The assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Palouse River Subbasin, located in northern Idaho.

The first part of this document, the SBA, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current §303(d) list of water quality limited water bodies. Eight segments of the Palouse River Subbasin were listed on the list. The SBA examines the current status of the §303(d) listed waters and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The TMDL analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

Subbasin at a Glance

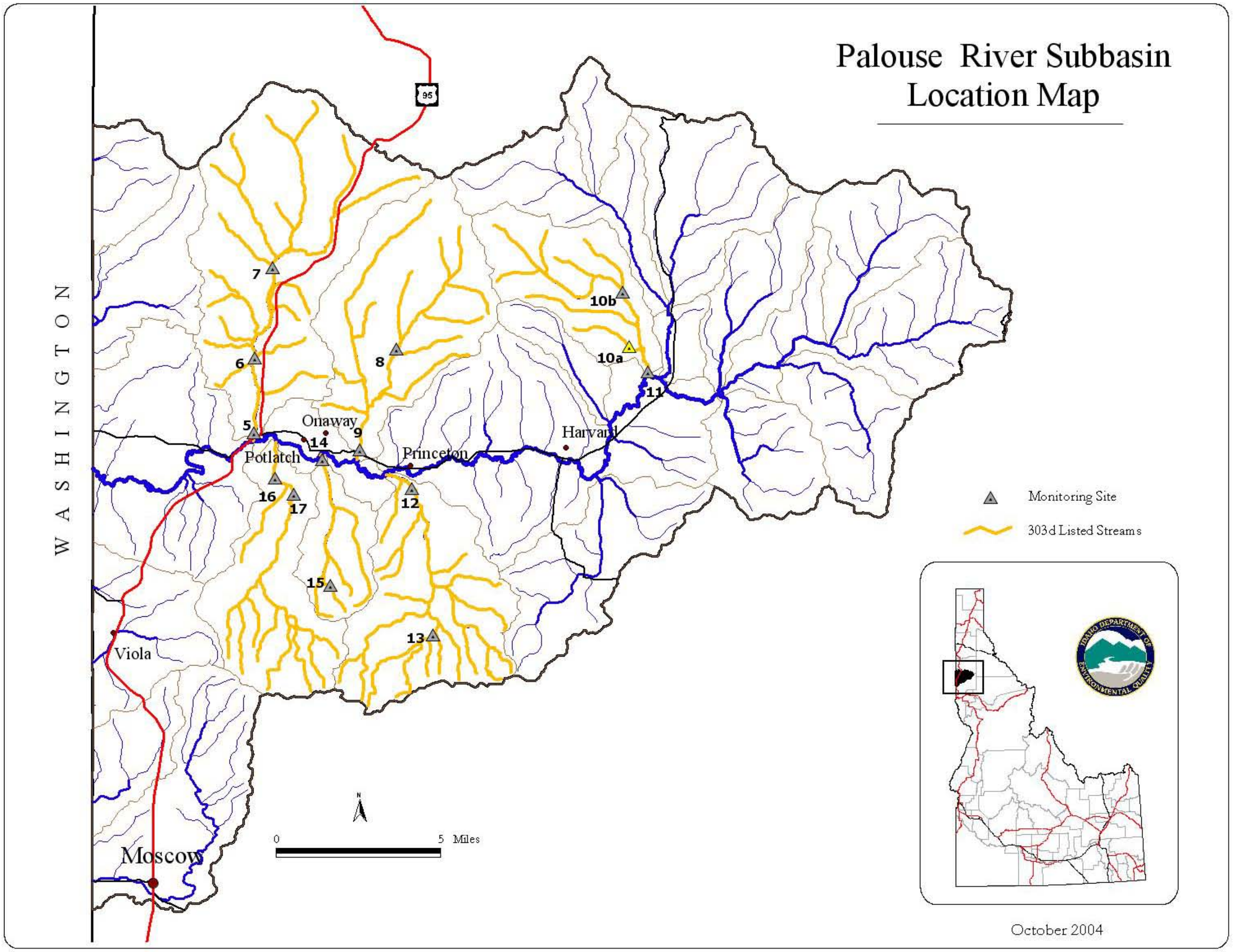
Within the Palouse River Subbasin (HUC #17060108), there are eight water bodies on the 1998 §303(d) list:

1. Big Creek
2. Deep Creek
3. Flannigan Creek
4. Gold Creek
5. Hatter Creek
6. Rock Creek
7. Cow Creek
8. South Fork Palouse River

Two of these water bodies, Cow Creek and the South Fork Palouse River, will be addressed in separate subbasin assessments and TMDLs. The remaining six water bodies will be addressed in this document.

The subbasin assessment portion of this document examines the current status of §303(d)-listed waters and determines if a water body is impaired, and if it is, the extent and cause(s) of impairment. The loading analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition that meets water quality standards.

Map A displays the general geographical location of the Palouse River Subbasin and the location of the §303(d) listed water bodies. The headwaters of the Palouse River originate in the Hoodoo Mountains of the St. Joe National Forest. The Palouse River and most of its tributaries originate in forested, mountainous terrain and flow downstream into the lower gradient rolling hill terrain of the Palouse River Subbasin, which is dominated by agricultural uses. The Palouse River flows into the State of Washington about six miles west of the town of Potlatch. The Palouse River Subbasin is approximately 407.25 square miles (260,641 acres) and is located primarily in Latah County. There are no anadromous fish in the Palouse River as Palouse River Falls, located in the State of Washington, blocks fish migration. Elevations range from 2,453 ft at the state line to 5,334 ft on Bald Mountain in the Hoodoo Mountain range. Most elevations are within 2,500 to 3,500 ft with most of the mid- to lower-elevation topography in the basin being the Palouse Loess. The north slopes are of moderate to steep rolling hills, while the south slopes are more gentle.



Map A. Location of the Palouse River Subbasin, Hydrological Unit 17060108 and the 303(d) waterbodies

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The Palouse River Subbasin is a sparsely populated area with one major town, Moscow, and several other small towns and communities, including Potlatch, Princeton, and Harvard. Total population in Latah County is 34,935 people (2000 census), which gives a density of 32.4 people per square mile. Agriculture, grazing, forestry, residential developments, and recreational activities are the major land uses of the subbasin. The Palouse River Subbasin is a popular destination for outdoor recreation activities, such as hunting, hiking, motorized recreation, mountain biking, camping, and fishing. There are no point sources within the §303(d) stream watershed boundaries.

The Palouse prairie is one of most productive agricultural areas in the world. The fertile soils and abundant winter and spring rain create ideal conditions for the production of wheat, barley, peas, and lentils, which are exported all over the globe. Historically, in the 1860s, the first European settlers used the Palouse hills as pastures but soon discovered the soils fertility and planted grain on the dry meadows and lower-side slopes. Horse and mule teams worked the land in the early 1900s. Machinery soon began to change farming and by 1930, 90% of the Palouse wheat was harvested using combines (Black, etc). The use of fertilizers after World War II increased crop production 200% to 400% (Black, etc). During this period, federal agricultural programs encouraged farmers to drain seasonally wet areas. In fewer than 100 years, small family farms have mostly disappeared as technology has allowed individual farmers to cultivate larger areas of land more efficiently. In the last few decades, some highly erodible lands have been removed from crop production under the Federal Conservation Reserve Program (CRP). Today, only a few patches of the Palouse River Subbasin are covered by native vegetation. Although agriculture is the most economically important feature of today's Palouse River Subbasin, it has had detrimental effects on the native landscape.

Over the last 100 years, farming has led to the loss of vast amounts of native plant habitat, and the native habitat that remains is badly fragmented into small isolated spots separated by acres of cultivated fields (Cook and Hufford). Most of the wetlands in the Palouse River Subbasin have been eliminated. These wetlands retained water during the wet periods and released cool groundwater into the streams during the dry summer months. Without these wetlands, rainfall and snowmelt do not infiltrate into the ground; instead, they flow rapidly as overland runoff into surface waterways and create problems such as gully, rill and in-stream erosion, flooding, deeply incised channels, higher peak runoffs, and low summer flows. The change in hydrology has changed the aquatic biota as well. Because of low summer flows, reduced shade, and loss of channel diversity, aquatic organism populations, such as fish and insects, have been eliminated or severely altered. An example of these changes is captured below:

- Deep Creek, once named for its deep perennial pools, is now classified as an intermittent stream downstream of the forest to agriculture interface. Historical information classified the entire portion of Deep Creek as a perennial stream. A United States Geological Survey (USGS) quad map dated 1955 displays Deep Creek as a perennial stream while the current USGS quad map displays Deep Creek as intermittent. Many intermittent streams in the Palouse are probably similar.

The economy of the Palouse is dominated by agriculture and two universities: the University of Idaho and Washington State University. Forestry, livestock, grazing, construction, and recreation are other economic factors. All of these affect water quality to some degree. Agriculture is and will continue to be the dominant economic factor in the Palouse River Subbasin. Preventing the rich, fertile soil of the Palouse River Subbasin from eroding and keeping it intact on the landscape is the major theme for this document. This theme, not only maintains and improves water quality but it is also the economic life force of the Palouse.

This document addresses the six water bodies on the 1998 §303(d) list that flow into the mainstem Palouse River within the state of Idaho: Big Creek, Deep Creek, Flannigan Creek, Gold Creek, Hatter Creek and the West Fork of Rock Creek (referred to as Rock Creek in this document) all flow into the Palouse River and are wholly located in the state of Idaho.

Table A displays the water bodies for which TMDLs were written and lists their respective pollutants of concern. All the streams have cold water aquatic life and secondary recreation as existing or designated beneficial uses. Some of the streams have salmonid spawning as an existing or designated use as well. DEQ collaborated with the Palouse River Tributaries Watershed Advisory Group and other participants to write five sediment, five temperature, five bacteria, and two nutrient TMDLs based primarily monitoring plan in Appendix A. The pollutants in the Palouse River Subbasin are from nonpoint sources.

The following are the major nonpoint sources for each of the pollutants:

- Sediment (above background): sheet and rill erosion off the landscape, roads, and stream bank and riparian areas
- Temperature: solar radiation
- Bacteria: cattle and other livestock, wildlife, and humans (homes and recreation)
- Nutrients: fertilizers, livestock, and septic systems

The TMDL loading capacity for each pollutant is based on the following:

- Sediment TMDLs: 25 nephlometric turbidity units (NTUs)s above background (the state standard)
- Temperature TMDLs: temperatures in streams shall not exceed natural background conditions (the state standard)
- Bacteria TMDLs: waters are not to contain E. coli bacteria significant to the public health in concentrations exceeding, a geometric mean of 126 *E.Coli* organisms per 100 ml based on a minimum of five samples taken every three to five days over a 30 day period at any 30 day period throughout the year or a single sample of 576 E. coli organisms per one hundred 100 ml (the state standard).
- Nutrient TMDLs: 0.10 mg/L total phosphorus and 6.0 mg/L dissolved oxygen (the state standard)

Table A. Streams and pollutants for which TMDLs were developed.

Stream (Creek)	Assessment Units	Pollutant(s)
Big	ID1706108CL027a_02 ID1706108CL027b_02	Temperature
Deep	ID1706108CL032a_02 ID1706108CL032a_03 ID1706108CL032b_02 ID1706108CL032b_03	Sediment, Temperature, Bacteria
Flannigan	ID1706108CL011a_02 ID1706108CL011a_03 ID1706108CL011b_02 ID1706108CL011b_03	Sediment, Temperature, Bacteria, Nutrients
Gold	ID1706108CL029_02 ID1706108CL029_03 ID1706108CL030_02 ID1706108CL031a_02 ID1706108CL031b_02	Sediment, Temperature, Bacteria
Hatter-upper	ID1706108CL015a_02	Sediment, Temperature, Bacteria
Hatter-lower	ID1706108CL015b_02 ID1706108CL015b_03	Sediment, Temperature, Bacteria, Nutrients
Rock	ID1706108CL012_03 ID1706108CL013a_02 ID1706108CL013b_03 ID1706108CL014a_02 ID1706108CL014b_02	Sediment, Bacteria

Key Findings

The subbasin assessment was written for the entire Palouse River Subbasin; however, only the six listed water bodies were intensively evaluated. TMDLs were only considered for the listed pollutants on the six listed water bodies. In the end seventeen TMDLs with four different pollutants were written for all six of the water bodies. Some pollutants were found to not be impairing beneficial uses for those streams and are recommended for removal from the §303(d) list. These decisions were based on data collected primarily through a monitoring plan jointly created and approved by the following governmental entities: DEQ-Lewiston Regional Office (LRO), Latah Soil and Water Conservation District (LSWCD), Idaho Soil Conversation Commission, and the Idaho Department of Agriculture. Idaho Association of Soil Conversation District, LSWCD, and DEQ-LRO staff conducted the monitoring.

Sediment

Sediment TMDLs were developed for five of the six §303(d) listed streams in this report: Deep Creek, Flannigan Creek, Gold Creek, Hatter Creek and Rock Creek. In these five water bodies, the beneficial uses of salmonid spawning and/or cold water aquatic life are not being fully supported. The target (load allocation) for the sediment TMDLs was based on the turbidity standard, which states that waters shall not exceed 25 NTU over background levels for greater than 10 days and shall not exceed 50 NTU over background at any time. The in-stream water quality target for sediment was developed to restore full support of designated beneficial uses.

Ten years of data from USGS Palouse River gage site near the town of Potlatch was gathered and compiled. By following the Lipscomb 1998 methodology for each §303(d)-listed stream, modifications were then made to the flows based on watershed size differences between each stream and the Palouse River's elevation, precipitation, geology, land cover, basin slope, and channel characteristics.

Based on the collected data in the monitoring year November 2001-November 2002, numeric relationships between discharge and NTU, discharge and TSS, and NTU and TSS were developed by plotting the values on a graph. These relationships can be expressed as mathematical equations, called regression equations, which were then used to determine existing TSS and NTU values on a daily basis and averaged daily for a 10-year period.

The background TSS value was calculated by multiplying a background ratio and the existing TSS value. A background ratio was calculated by dividing the background erosion value from the total sediment erosion value within the Revised Universal Soil Loss Equation (RUSLE) model.

The load capacity was calculated by taking the TSS value equal to 25 NTU, multiplying by daily flow and a conversion factor (to express the load capacity in tons per day), and then adding the background TSS in tons per day. The load allocation is determined by subtracting the background sediment from the load capacity. Once the load capacity was determined the excess load or load reduction was calculated by subtracting the load capacity from the existing TSS load. The excess load was then expressed in tons per year and a percentage was calculated. These steps were performed for each §303(d)-listed stream.

The load reductions are displayed as total tons per year and as a percentage in Table B. To reach the load reductions stated below, the amount of TSS measured in the streams will have to be lowered during the winter and spring seasons, as this is when the majority of the sediment is being transported. These reductions are applicable throughout each watershed (headwaters to mouth and all tributaries within the watershed).

Table B. Sediment nonpoint source load analysis for Palouse River Subbasin.

Source (Creek)	Existing Load[a]	Back-ground[a]	Load Capacity[a]	Load Allocation[a]	Load Reduction[a]	Load Reduction (%)
Deep	7040.85 t/yr	233.60 t/yr	613.20 t/yr	379.60 t/yr	6541.15 t/yr	96%
Flannigan	1452.70 t/yr	62.10 t/yr	525.60 t/yr	463.55 t/yr	937.69 t/yr	67%
Gold	661.65 t/yr	25.55 t/yr	368.65 t/yr	343.10 t/yr	294.47 t/yr	46%
Hatter	1222.75 t/yr	219.00 t/yr	795.70 t/yr	546.70 t/yr	466.77 t/yr	46%
Rock	147.88 t/yr	12.34 t/yr	54.75 t/yr	42.41 t/yr	94.90 t/yr	69%

[a] t/yr = tons per year

Temperature

Temperature TMDLs were written for the Big Creek, Deep Creek, Flannigan Creek, Gold Creek and Hatter Creek watersheds. In these five watersheds, heat is a pollutant impairing the beneficial uses of salmonid spawning and/or cold water aquatic life. The temperature targets are based on (IDAPA 58.01.02.200.09 which states, “When natural background conditions exceed any applicable water quality criteria set forth in Sections 21,250,251, or 253, the applicable water quality criteria shall not apply; instead, pollutant levels shall not exceed the natural background conditions). In laymen’s terms the temperature targets are based on a natural riparian plant cover condition over the streams. In this TMDL, potential natural vegetation cover (PNV) represents the loading capacity of the stream in terms of minimum heat load. This analysis contains an implicit margin of safety as all streams are assumed to be at maximum PNV at loading capacity, when in reality natural cover can be more variable due to natural forces (e.g. aspect, precipitation zones, fire, wind throw, drought or other natural events). Existing vegetative cover represents the existing load of heat to the streams. Those segments of the streams with the largest differential between PNV and existing cover (existing cover less than potential cover) are assumed to cause the most heating to the stream.

This analysis was accomplished by overlaying a soil survey Geographical Information Systems (GIS) layer with the stream GIS layer. For each soil type a respective vegetation community exists. The maximum potential for each vegetation community (when the vegetation community is at a climax) is the PNV. Within each assessment unit (AU) (section of a stream) several soils types intersect with the stream creating numerous reaches with different PNVs. The tables in Appendix E display all of these reaches for each AU and their existing loads, load capacities and load allocations. The information in Appendix E should be referenced to assist with implementation of this TMDL. For the executive summary, the soil reach information was summarized for each AU and major tributary within an AU in Tables C through G.

The tables C through G summarize this information into average existing loads, average load capacities and average load allocations for each AU and major tributary within an AU for the Big Creek, Deep Creek, Flannigan Creek, Gold Creek and Hatter Creek watersheds. Because these reaches are averaged, an AU or major tributary that has a classification of ‘good’ is not necessarily exempt from a load reduction (shade increase). It is possible that within these 'good' AUs or major tributaries there are individual reaches that need a shade increase but the overall average for that AU is in a 'good' condition. Maps E-1 and E-2 visually display these shade increases and they exist in virtually every AU or major tributary even if its average overall condition is classified as 'good.'

Table C. Temperature load nonpoint source allocations for Big Creek.

Segment	Average PNV (Load Capacity)	Average Existing Cover (Existing Load)	Average Cover Condition Class
Lower Big Creek (AU #ID17060108CL027b_02)	70%	56.7%	Fair
Lost Creek (AU #ID17060108CL027b_02)	73.3%	63.3%	Fair
Last Chance Creek (AU #ID17060108CL027b_02)	80%	80%	Good
Tributaries to Lower Big (AU #ID17060108CL027b_02)	71.7%	61.7%	Fair
Upper Big Creek (AU #ID17060108CL027a_02)	80%	80%	Good
Tributaries to Upper Big (AU #ID17060108CL027a_02)	82.5%	73.8%	Fair

LA= ((Existing cover – Potential cover)/Potential cover) x 100.

Table D. Temperature load nonpoint source allocations for Deep Creek.

Segment	Average PNV (Load Capacity)	Average Existing Cover (Existing Load)	Average Cover Condition Class
Lower Deep Creek (AU #ID17060108CL032b_03)	54.4%	15.6%	Very Poor
Tributaries to Lower Deep (AU#ID17060108CL032b_02)	65.2%	21.2%	Very Poor
Upper Deep Creek (AU #ID17060108CL032a_03)	50%	25%	Very Poor
East Fork Deep Creek (AU #ID17060108CL032a_02)	68.5%	47.7%	Poor
Middle Fork Deep & Tribs (AU#ID17060108CL032a_02)	69.5%	54%	Poor
West Fork Deep & Trib (AU #ID17060108CL032a_02)	71.8%	62.9%	Fair
Tributary to Upper Deep (AU #ID17060108CL032a_02)	68.9%	43.3%	Poor

LA= ((Existing cover – Potential cover)/Potential cover) x 100.

Table E. Temperature load nonpoint source allocations for Flannigan Creek.

Segment	Average PNV (Load Capacity)	Average Existing Cover (Existing Load)	Average Cover Condition Class
Lower Flannigan (AU #ID17060108CL011b_03)	68%	43%	Poor
Upper Flannigan (AU #ID17060108CL011a_03)	56.7%	58.3%	Good
Tributary to Lower Flannigan (AU#ID17060108CL011b_02)	70%	35.7%	Very Poor
Tributary to Upper Flannigan (AU#ID17060108CL011a_02)	76.7%	73.3%	Fair
Tributary to Upper Flannigan (AU#ID17060108CL011a_02)	76%	78%	Good
Tributary to Upper Flannigan (AU#ID17060108CL011a_02)	76.7%	70%	Fair
West Fork Flannigan (AU #ID17060108CL011a_02)	62.2%	62.2%	Good
Tributary to WF Flannigan (AU#ID17060108CL011a_02)	80%	75%	Fair
Tributary to WF Flannigan (AU#ID17060108CL011a_02)	87.5%	75%	Fair

LA= ((Existing cover – Potential cover)/Potential cover) x 100.

Table F. Temperature load nonpoint source allocations for Gold Creek.

Segment	Average PNV (Load Capacity)	Average Existing Cover (Existing Load)	Average Cover Condition Class
Lower Gold & Lowest Trib (AU #ID17060108CL029_03)	60%	23.3%	Very Poor
Upper Gold (AU #ID17060108CL030_02)	67.7%	63.1%	Fair
Nelson Creek (AU #ID17060108CL030_02)	71.1%	70%	Good
Tributary to Upper Gold (AU #ID17060108CL030_02)	78%	66%	Fair
Waterhole Creek (AU #ID17060108CL030_02)	75%	75%	Good
Tributary to Upper Gold (AU #ID17060108CL030_02)	80%	75%	Fair
Tributaries to Upper Gold (AU #ID17060108CL030_02)	83.3%	83.3%	Good
Lower Crane Creek (AU #ID17060108CL031b_02)	70%	55%	Poor
Tributaries to Lower Crane (AU #17060108CL031b_02)	70%	31.3%	Very Poor
Upper Crane Creek (AU #ID17060108CL031a_02)	76%	72%	Fair

LA= ((Existing cover – Potential cover)/Potential cover) x 100.

Table G. Temperature load nonpoint source allocations for Hatter Creek.

Segment	Average PNV (Load Capacity)	Average Existing Cover (Existing Load)	Average Cover Condition Class
Lower Hatter (AU #ID17060108CL015b_03)	63.3%	38.7%	Poor
Tributary to Lower Hatter (AU #ID17060108CL015b_02)	70%	47%	Poor
Tributary to Lower Hatter (AU#ID17060108CL015b_02)	72.3%	59.2%	Fair
Tributary to Lower Hatter (AU #ID17060108CL015b_02)	78.6%	58.6%	Poor
Tributary Complex to Lower Hatter (AU#ID17060108 CL015b_02)	77.9%	64.5%	Fair
Tributary to Lower Hatter (AU #ID17060108CL015b_02)	77.1%	58.6%	Poor
Upper Hatter and Tributaries (AU#ID17060108CL015a_02)	84.3%	72.5%	Fair
Long Creek (AU #ID17060108CL015a_02)	85.7%	68.6%	Fair

LA= ((Existing cover – Potential cover)/Potential cover) x 100.

Bacteria

Bacteria TMDLs were developed for five of the six §303(d)-listed streams in this report: Deep Creek, Flannigan Creek, Gold Creek, Hatter Creek and Rock Creek. In these water bodies, the beneficial use of secondary contact recreation is not being fully supported. The three main sources of bacteria are cattle and other livestock, wildlife, and humans (homes and recreation), but specific sources are unknown. Tables H through M display the current load, load allocation, margin of safety, and load reductions fro each of the five streams with a bacteria TMDL. The target for the bacteria TMDLs is IDAPA 58.01.02.251.02 which states that, "Waters designated for secondary contact recreation not to contain *E. coli* bacteria significant to the public health in concentrations exceeding: a single sample of five hundred seventy-six (576) *E. coli* organisms per one hundred (100) ml; or a geometric mean of one hundred twenty -six (126) per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to five (5) days over a thirty (30) day period." The bacteria TMDLs are based on the month when exceedance(s) occurred.

E. coli and other harmful bacterium have a lifespan outside of warm-blooded digestional tracks of about 24-30 hours, which is enough time for bacteria sources in the headwaters of a stream to move downstream throughout the entire stream and into other water bodies like the Palouse River. Therefore, it is critical that all sources of bacteria be reduced and maintained within state standards to ensure the contact recreational beneficial use is protected throughout the Palouse River Subbasin.

The bacteria load capacity for Deep Creek, Flannigan Creek, Gold Creek, Hatter Creek, and Rock Creek is set at a level that fully supports the recreational beneficial use. Seasonal variations, background levels, and a 10% margin of safety to account for any uncertainty were calculated within the load capacity. Each §303(d)-listed stream has a different seasonal variation of when bacteria exceedances occurred. Tables H through L display these exceedance occurrences. Since harmful bacteria has a relatively short lifespan, it made sense to specify the month for load reductions. Bacteria, unlike sediment, does not stay in a stream network for weeks, months, or years; it stays within a stream network for about a day and then dies.

Table H. Bacteria nonpoint sources load allocations for Deep Creek.

Source	Month	Current Load (*E.coli* organisms/day)	Load Allocation (*E.coli* organisms/day)	MOS (10%)	Load Reduction (*E.coli* organisms/day)
Unknown (PR5)	Dec	2.99×10^{11}	1.01×10^{11}	1.98×10^{10}	2.18×10^{11}
Unknown (PR6)	Dec	3.26×10^{11}	7.83×10^{10}	2.48×10^{10}	2.73×10^{11}
Unknown (PR5)	Dec	3.95×10^{11}	2.32×10^{11}	1.63×10^{10}	1.79×10^{10}
Unknown (PR6)	Dec	3.49×10^{11}	3.24×10^{11}	2.5×10^{9}	2.75×10^{10}
Unknown (PR5)	Mar	1.53×10^{12}	1.01×10^{12}	5.2×10^{10}	5.72×10^{11}
Unknown (PR5)	Mar	8.49×10^{11}	7.08×10^{11}	1.41×10^{10}	1.55×10^{11}
Unknown (PR6)	May	2.15×10^{11}	2.03×10^{11}	1.2×10^{9}	1.32×10^{10}
Unknown (PR7)	June	3.64×10^{10}	1.75×10^{10}	1.89×10^{9}	2.08×10^{10}

Table I. Bacteria nonpoint sources load allocations for Flannigan Creek.

Source	Month	Current Load (*E.coli* organisms/day)	Load Allocation (*E.coli* organisms/day)	MOS (10%)	Load Reduction (*E.coli* organisms/day)
Unknown (PR16)	Mar	6.65×10^{11}	6.28×10^{11}	3.7×10^{9}	4.07×10^{10}
Unknown (PR16)	May	5.81×10^{11}	1.39×10^{11}	4.42×10^{10}	4.86×10^{11}
Unknown (PR17)	May	4.16×10^{11}	1.50×10^{11}	2.66×10^{10}	2.93×10^{11}
Unknown (PR17)	Jun	3.35×10^{10}	2.79×10^{10}	5.6×10^{8}	6.16×10^{9}
Unknown (PR17)	Jul	8.83×10^{10}	2.12×10^{10}	6.71×10^{9}	7.38×10^{10}
Unknown (PR17)	Jul	1.27×10^{10}	1.09×10^{10}	1.8×10^{8}	1.98×10^{9}
Unknown (PR17)	Jul	2.09×10^{10}	5.02×10^{9}	1.59×10^{9}	1.75×10^{10}
Unknown (PR17)	Aug	2.44×10^{9}	2.34×10^{9}	1.00×10^{7}	1.10×10^{8}
Unknown (PR17)	Sep	8.17×10^{9}	4.71×10^{9}	3.46×10^{8}	3.81×10^{9}
Unknown (PR17)	Sep	1.04×10^{10}	2.51×10^{9}	7.89×10^{8}	8.68×10^{9}
Unknown (PR17)	Oct	8.94×10^{9}	5.99×10^{9}	2.95×10^{8}	3.25×10^{9}

Table J. Bacteria nonpoint sources load allocations for Gold Creek.

Source	Month	Current Load (*E.coli* organisms/day)	Load Allocation (*E.coli* organisms/day)	MOS (10%)	Load Reduction (*E.coli* organisms/day)
Unknown (PR9)	Nov	1.18×10^{11}	2.82×10^{10}	8.98×10^{9}	9.88×10^{10}
Unknown (PR9)	Dec	1.34×10^{11}	1.19×10^{11}	1.5×10^{9}	1.65×10^{10}
Unknown (PR8)	Aug	2.59×10^{9}	1.35×10^{9}	1.24×10^{8}	1.36×10^{9}
Unknown (PR9)	Sep	1.96×10^{10}	4.71×10^{9}	1.49×10^{9}	1.64×10^{10}
Unknown (PR8)	Oct	3.80×10^{9}	3.78×10^{9}	2.0×10^{6}	2.20×10^{7}

Table K. Bacteria nonpoint sources load allocations for Hatter Creek.

Source	Month	Current Load (*E.coli* organisms/day)	Load Allocation (*E.coli* organisms/day)	MOS (10%)	Load Reduction (*E.coli* organisms/day)
Unknown (PR12)	Dec	4.54×10^{10}	3.79×10^{10}	7.50×10^{8}	8.25×10^{9}
Unknown (PR12)	Mar	3.72×10^{12}	8.93×10^{11}	2.83×10^{11}	3.11×10^{12}
Unknown (PR13)	Mar	3.29×10^{12}	7.89×10^{11}	2.5×10^{11}	2.75×10^{12}
Unknown (PR12)	May	1.00×10^{12}	5.25×10^{11}	4.75×10^{10}	5.23×10^{11}
Unknown (PR12)	Jun	1.19×10^{11}	9.96×10^{10}	1.94×10^{9}	2.13×10^{10}
Unknown (PR12)	Jul	2.21×10^{10}	1.96×10^{10}	2.5×10^{8}	2.75×10^{10}
Unknown (PR13)	Jul	5.59×10^{10}	3.28×10^{10}	2.31×10^{9}	2.54×10^{10}
Unknown (PR12)	Jul	1.45×10^{10}	8.35×10^{9}	6.15×10^{8}	6.77×10^{9}
Unknown (PR13)	Jul	2.43×10^{10}	2.03×10^{10}	4.0×10^{8}	4.4×10^{9}
Unknown (PR12)	Aug	1.53×10^{9}	1.21×10^{9}	3.2×10^{7}	3.52×10^{8}

Table L. Bacteria nonpoint sources load allocations for Rock Creek.

Source	Month	Current Load (*E.coli* organisms/day)	Load Allocation (*E.coli* organisms/day)	MOS (10%)	Load Reduction (*E.coli* organisms/day)
Unknown (PR14)	Dec	8.91×10^{10}	8.41×10^{10}	5.0×10^{8}	5.5×10^{9}
Unknown (PR15)	Mar	8.29×10^{10}	8.24×10^{10}	5.0×10^{7}	5.5×10^{8}

Nutrients

Nutrient TMDLs were developed for the lower section of Hatter Creek watershed and the entire Flannigan Creek watershed. The nutrient target is based on the state's numeric standard for dissolved oxygen (DO), which requires DO levels to be greater than 6.0 mg/L at all times, and a narrative target, which requires that surface waters shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses. The data supporting the nutrient TMDLs show a consecutive period of elevated total phosphorus levels and low DO levels during the growing season.

The load capacity is defined as the amount of pollutant a water body can receive without violating water quality standards. The load capacity for Flannigan Creek and Hatter Creek is set at a level that fully supports beneficial uses. Seasonal variation, a background amount (BK), a margin of safety (MS), and a load allocation (LA), were all considered to determine the load capacity (LC),which is represented in the following equation:

LC=MS+BK+LA.

Nutrient data was collected between 2001 and 2002 within four reference watersheds with similar geologies, land-uses, and very minimal anthropogenic (human-caused) impacts. The yearly TP average of these watersheds ranged from 0.0314 to 0.0398 mg/L, with a combined average of 0.035. This is the background value that was used in the TMDL loading calculation.

A load allocation (LA) of 0.070 mg/L (nearly double the background amount) was established for these TMDLs. A margin of safety of 0.05 mg/L was applied to the equation to arrive at the 0.10 mg/L TP as a load capacity for nutrient TMDLs in the Palouse River Tributaries Subbasin. In addition to the TP target, the DO readings within Flannigan Creek and the lower portion of Hatter Creek will need to stay above 6.0 mg/L. These nutrient TMDLs only apply during the growing season, May-October, of each year. Typically, this is the critical time period when low DO levels are present because of excess nutrients and low stream flows. Best Management Practices should be applied on the landscape throughout the year as to ensure that excessive nutrients do not get into a stream and to ensure that the goals of these nutrient TMDLs are achieved. It should be noted low summer flows contributed in some manner to the low DO readings collected in this report.

For Flannigan Creek, the mass per unit volumes for the current load, load capacity, and load reduction amounts were calculated based on the discharge data averaged over a period of one month. Load reductions are required during the months of June and July at both sites, followed by a load reduction for the lower site only in the month of August. These load reductions are shown in Table M. For Hatter Creek, the mass per unit volumes for the current load, load capacity, and load reduction amounts were calculated based on the discharge data for each exceedance averaged over a period of one month. The load reductions in Hatter Creek will be required during August 15th through September 15th of each year. This load reduction for the lower portion of Hatter Creek is shown in Table N. Load allocations were assigned calculated to Flannigan Creek and the lower portion of Hatter Creek. The load allocation is the load capacity minus the natural background. A value was calculated for each §303(d)-listed water body and is displayed in Table M.

Table M. Nutrient nonpoint source load analysis for Palouse River Subbasin.

Source (Creek)	Month	Pollutant	Existing Load	Load Capacity	Load Allocation	Load Reduction
Flannigan (PR-16)	6/1-6/30	Total Phosphorus	1.883 lbs/day	1.487 lbs/day	1.368 lbs/day	0.396 lbs/day
Flannigan (PR-17)	6/1-6/30	Total Phosphorus	2.397 lbs/day	2.122 lbs/day	1.655 lbs/day	0.275 lbs/day
Flannigan (PR-16)	7/1-7/31	Total Phosphorus	0.501 lbs/day	0.418 lbs/day	0.355 lbs/day	0.083 lbs/day
Flannigan (PR-17)	7/1-7/31	Total Phosphorus	0.743 lbs/day	0.474 lbs/day	0.578 lbs/day	0.269 lbs/day
Flannigan (PR-16)	8/1-8/31	Total Phosphorus	0.087 lbs/day	0.083 lbs/day	0.083 lbs/day	0.004 lbs/day
Hatter (PR-12)	8/15-9/15	Total Phosphorus	0.061 lbs/day	0.051 lbs/day	0.051 lbs/day	0.011 lbs/day

Summary

Table N displays the proposed outcomes for all six listed water bodies. It includes recommended changes to the §303(d) list. All recommendations are based on the most current and accurate data and data analysis available to DEQ.

Table N. Summary of assessment outcomes.

Segment (Creek)	Assessment Units	Pollutant	TMDL(s) Completed	Recommended Changes to 303(d) List	Justification
Big	ID1706108CL027a_02 ID1706108CL027b_02	Sed[1], Temp[2], Nut[3], Bact[4]	Yes- Temp	Remove Sed; Nut, Bact	Data
Deep	ID1706108CL032a_02 ID1706108CL032a_03 ID1706108CL032b_02 ID1706108CL032b_03	Sed, Temp, Nut, Bact	Yes-Sed, Temp, Bact	Remove Nut	Data / Intermittent Stream
Flannigan	ID1706108CL011a_02 ID1706108CL011a_03 ID1706108CL011b_02 ID1706108CL011b_03	Sed, Temp, Nut, Bact	Yes-Sed, Temp, Bact, Nut	None	Data
Gold	ID1706108CL029_02 ID1706108CL029_03 ID1706108CL030_02 ID1706108CL031a_02 ID1706108CL031b_02	Sed, Temp, Nut, Bact	Yes-Sed, Temp, Bact	Remove Nut	Data
Hatter-upper	ID1706108CL015a_02	Sed, Temp, Nut, Bact	Yes-Sed, Temp, Bact	Remove Nut	Data
Hatter-lower	ID1706108CL015b_02 ID1706108CL015b_03	Sed, Temp, Nut, Bact	Yes-Sed, Temp, Bact, Nut	Remove Nut from (upper ½)	Data
Rock	ID1706108CL012_03 ID1706108CL013a_02 ID1706108CL013b_03 ID1706108CL014a_02 ID1706108CL014b_02	Sed, Temp, Nut, Bact	Yes-Sed, Bact	Remove Temp, Nut	Data / Intermittent Stream

[1] Sed = Sediment
[2] Temp = Temperature
[3] Nut = Nutrients
[4] Bact = Bacteria

Public Input and Meetings

A public meeting was held in June 2003 to solicit citizen participation. A news release, advertisements in three local newspapers, a radio public service announcement, and an advertisement on the DEQ Web site were all coordinated for the June meeting. The Palouse River Tributaries Watershed Advisory Group (WAG) was formed in October of 2003 with fifteen representatives compiling the land-uses within the Palouse area. Meetings were held in July 2003, September 2003, April 2004, June 2004, August 2004, and October 2004. Several other individuals are participating with the group even though they are not official WAG members. Membership on the WAG includes citizens at large, ranch owners, farmers, environmental interests, landowners in the basin, Potlatch Corporation, Bennett Lumber, and several local, state, and federal government representatives. The WAG has reviewed two different draft versions of this document. The WAG submitted informal comments to DEQ, which were incorporated in the final document. This informal comment process gave the WAG members an opportunity to add significant input to the document. The WAG's involvement with the TMDL process and development of this document has been instrumental, and they should be commended for their efforts. A public meeting was held in the town of Potlatch on November 15, 2004, (during the 30-day formal comment period) as part of the Clearwater Basin Advisory Group's November meeting. A meeting was held in December 2004 with the Palouse River Tributaries WAG to focus on how to begin implementation of the TMDL. The WAG continues to make progress as a meeting is scheduled for January 2005 and most probably future meetings in order to complete the implementation for this TMDL. The WAG should be commended on their efforts and significant amount of time that they have invested in the Palouse River Tributaries TMDL process.